

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

READ, Matthew, Charles
Venner, Shipley & Co,
20 Little Britain
London EC1A 7DH
ROYAUME-UNI

Date of mailing (day/month/year) 27 July 2000 (27.07.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference	
International application No. PCT/GB99/01556	
	International filing date (day/month/year) 17 May 1999 (17.05.99)

1. The following indications appeared on record concerning:	
<input type="checkbox"/> the applicant	<input type="checkbox"/> the inventor
<input checked="" type="checkbox"/> the agent	<input type="checkbox"/> the common representative
Name and Address DOBLE, Richard, G., V. RD Patents Designs Copyright 42 Denmark Road Ealing W13 8RG United Kingdom	State of Nationality
	State of Residence
	Telephone No. 44 870 321 1890
	Facsimile No. 44 207 504 8490
Teleprinter No.	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:	
<input checked="" type="checkbox"/> the person	<input type="checkbox"/> the name
<input type="checkbox"/> the address	<input type="checkbox"/> the nationality
<input type="checkbox"/> the residence	
Name and Address READ, Matthew, Charles Venner, Shipley & Co, 20 Little Britain London EC1A 7DH United Kingdom	State of Nationality
	State of Residence
	Telephone No.
	Facsimile No.
Teleprinter No.	
3. Further observations, if necessary:	
4. A copy of this notification has been sent to:	
<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer R. Chrem
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C. 20231
 ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 11 January 2000 (11.01.00)	Applicant's or agent's file reference
International application No. PCT/GB99/01556	Priority date (day/month/year) 15 May 1998 (15.05.98)
International filing date (day/month/year) 17 May 1999 (17.05.99)	
Applicant WILSON, Jeremy, David, Norman et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
07 December 1999 (07.12.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election: ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
 34, chemin des Colombettes
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Form PCT/IB/331 (July 1992)

Authorized officer

S. Mafia

Telephone No.: (41-22) 338.83.38

3044135

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

VENNER, SHIPLEY & CO.
20 Little Britain
London EC1A 7DH
GRANDE BRETAGNE

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing
(day/month/year) 13.07.2000

Applicant's or agent's file reference
3D MOD 2

IMPORTANT NOTIFICATION

International application No.
PCT/GB99/01556

International filing date (day/month/year)
17/05/1999

Priority date (day/month/year)
15/05/1998

Applicant
TRICODER TECHNOLOGY PLC et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Benigar, M

Tel. +49 89 2399-2996



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REC'D 18 JUL 2000

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 3D MOD 2	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB99/01556	International filing date (day/month/year) 17/05/1999	Priority date (day/month/year) 15/05/1998
International Patent Classification (IPC) or national classification and IPC G06T7/00		
Applicant TRICODER TECHNOLOGY PLC et al.		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 8 sheets, including this cover sheet.
 - ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

- This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 07/12/1999	Date of completion of this report 13.07.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Kessler, C Telephone No. +49 89 2399 2582 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01556

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

Description, pages:

1-34 as originally filed

Claims, No.:

1-52 as originally filed

Drawings, sheets:

1-11 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
☒ claims Nos. 4-8, 10-12, 14-19, 24, 25, 31-35, 29, 38 - 52.

because:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01556

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 4-8, 10-12, 14-19, 24, 25, 31-35, 29, 38 - 52 are so unclear that no meaningful opinion could be formed (*specify*):

see separate sheet

- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB99/01556

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1 - 37
	No:	Claims
Inventive step (IS)	Yes:	Claims 21-24
	No:	Claims 1-3, 13, 26-28, 36, 37
Industrial applicability (IA)	Yes:	Claims 1-37
	No:	Claims

2. Citations and explanations

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

D1 to D5 are referred to as the documents cited in the International Search Report, according to the sequence in which they are listed there.

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. Claims 38, 39:
It is obscure how "aligned virtual projectors" should generate a 3D reconstruction of an object. Also what kind of reconstruction and where it should be generated is enigmatic.
2. Claims 40, 48 (and with them their dependent claims):
Here the same obscurity persists in addition to further insufficient definitions:
How (claim 40) should "correspondences be generated" between calibration and object image? What kind of "correspondences"?
Onto what should these simulated projections be made? Two flat images projected onto a flat plane just yield a blurry image, no "3D representation". And how should the projections "link respective correspondences", resp. the 3D representation be derived from "mutual intersections"?
3. Claims 4-8 and 29:
The effects of the condition "the net movement of the camera not being fully constrained" to the technical definition are obscure. These claims only present a problem, no solution.
4. Claims 10-12, 14-19, 24 and 31-35:
The "projection" feature is obscure as in claims 40 et seq.
5. Claim 25:
Curvature of what field?

Re Item IV

Lack of unity of invention

1. Claims 1, 2, 26 and 27 relate to deriving a 3D representation of an object, either by means of capturing images from different viewpoints (claims 1, 26, 38 and 39) or by means of projecting structured radiation onto the object (claims 2 and 27). Claims 38-40 and 48 relate to generating a 3D representation of an object from "projections". Furthermore, claims 36 and 37 relate to determining the motion of a camera by means of projecting the paths of features of an image to a common vanishing point.
2. Hence the claims can be grouped into three primary groups:

Group A, claims 1, 2, 26 and 27 and dependent claims;
Group B, claims 38-40 and 48 and dependent claims;
Group C, claims 36 and 37.
3. They are not so linked as to form a single general inventive concept (Rule 13.1 PCT) for the following reasons:
 - 3.1 The common feature of these claims is three-dimensional modelling by means of views from two viewpoints (assuming that the projector for the "structured radiation" is placed apart from the camera taking the picture). This is notorious ("photogrammetry") in the field of 3D modelling, see D4, figures 1a and 1b and the corresponding description, chapter I ("introduction").
 - 3.2 This feature that is argued in the description at page 6, lines 14-22, to link the differing approaches (two images or one image with known structure projected onto the object), namely the "intersecting projections", has always existed for these approaches and does not become new by being explicitly identified in the present application.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Claims 1, 2, 26 and 27 define in method and apparatus form deriving a 3D representation of an object, by means of capturing images from different viewpoints or by means of projecting structured radiation onto the object. Both approaches are well known in the art, as is also acknowledged in the description, and are e.g. disclosed in D4, chapter I.

These claims additionally define a scaling variable representing the distance between the two viewpoints, resp. between the viewpoint and the projection point.

Although such scaling variable is not directly derivable from the prior art (see however D2, abstract, and chapter 1.2, first paragraph), it follows inevitably from the application of geometry to the problem (triangulation) that an unknown remains when the distance between the viewpoints is not known. No inventive step can be seen in naming that unknown as what it is (a scaling variable).

2. Similar considerations apply to claims 3, 13 and 28: changing the size on the display in correspondence to a value of the scaling variable is obvious and trivial; also matching the representation to another.
3. Combining several representations into one is not derivable from the available prior art, claims 21-24.
4. The computation of the vector of motion (ie the direction) as defined in claims 36 and 37 also follows from the application of ordinary geometry (cf. the description of the present application, page 22, lines 15-27). Hence the subject matter of these claims lacks inventive step.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB99/01556

Re Item VIII

Certain observations on the international application

1. Claim 20 only poses a problem ("combining" two or more 3D representations of the same object), but neither it nor claims 22-25 offer a solution to the problem of dealing with features that differ geometrically in the two representations (apart from translation, rotation and scaling, different views may lead to different computed topographies).

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION		see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/GB 99/ 01556	International filing date (day/month/year) 17/05/1999	(Earliest) Priority Date (day/month/year) 15/05/1998	
Applicant TRICODER TECHNOLOGY PLC et al.			

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.
☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item:
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

- ☒ as suggested by the applicant.
- ☐ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 99/01556

A* CLASSIFICATION OF SUBJECT MATTER

IPC 6 G06T7/00 G06T15/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	HARTLEY R I: "IN DEFENCE OF THE 8-POINT ALGORITHM" PROC. FIFTH INTERNAT. CONF. ON COMPUTER VISION, CAMBRIDGE, MA., JUNE 20 - 23, 1995, no. 5, pages 1064-1070, XP000557481 IEEE, ISBN: 0-7803-2925-2 abstract paragraphs '0001!', '0006!', '0007! --- -/-	1, 26, 38, 39



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

13 September 1999

Date of mailing of the international search report

28/09/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Jonsson, P.O.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/01556

C:(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	HARTLEY R ET AL: "STEREO FROM UNCALIBRATED CAMERAS" PROC. COMP. SOC. CONF. ON COMPUTER VISION AND PATTERN RECOGNITION, CHAMPAIGN, IL, JUNE 15 - 18, 1992, 15 June 1992 (1992-06-15), pages 761-764, XP000357427 IEEE, ISBN: 0-8186-2855-3 cited in the application abstract paragraph '0001! ---	1, 26, 38, 39
A	BAKER H H ET AL: "GENERALIZING EPIPOLAR-PLANE IMAGE ANALYSIS FOR NON-ORTHOGONAL AND VARYING VIEW DIRECTIONS" IMAGE UNDERSTANDING WORKSHOP. PROCEEDINGS, vol. 2, 1 January 1987 (1987-01-01), pages 843-848, XP000572538 abstract paragraph '0001! ---	5-7, 10, 11
A	ALBRECHT P ET AL: "IMPROVEMENT OF THE SPATIAL RESOLUTION OF AN OPTICAL 3-D MEASUREMENT PROCEDURE" INSTRUMENTATION/MEASUREMENT TECHNOLOGY CONF. (IMTC), OTTAWA, MAY 19 - 21, 1997, vol. 1, no. 14, pages 124-129, XP000725373 IEEE, ISBN: 0-7803-3748-4 abstract; figure 1 ---	1, 2, 26, 27, 38-40, 48
A	OTTO G P ET AL: "'Region-growing' algorithm for matching of terrain images" IMAGE AND VISION COMPUTING, MAY 1989, UK, vol. 7, no. 2, pages 83-94, XP002115154 ISSN: 0262-8856 cited in the application -----	